CLAIMS TO INVENTION

1. An electro-optical glazing structure having reflection and transmission modes of operation for selectively reflecting and transmitting electromagnetic radiation, respectively, said electro-optical glazing structure comprising:

an electro-optical glazing panel of laminated construction, having first and second optical states of operation; and

optical state switching means for switching said electro-optical glazing panel to said first optical state of operation in order to induce said electro-optical glazing structure into said reflection mode of operation, and for switching said electro-optical glazing panel to said second optical state of operation in order to induce said electro-optical glazing structure into said transmission mode of operation.

2. The electro-optical glazing structure of claim 1, wherein said electro-optical glazing panel comprises:

a first electrically-passive cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel;

a second electrically-passive CLC electromagnetic radiation polarizing panel;

and

an electrically-active π-phase retardation panel interposed between said first and second electrically-passive CLC electromagnetic radiation polarizing panels.

3. The electro-optical glazing structure of claim 2, wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels reflect electromagnetic radiation having a first circularly

polarized state when said electro-optical glazing panel is switched to said first optical state of operation,

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels transmit electromagnetic radiation having a second circularly polarized state when said electro-optical glazing panel is switched to said first optical state of operation; and

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels reflect or transmit without absorption electromagnetic radiation having either said first state or said second state when said electro-optical glazing panel is switched to said second optical state of operation.

4. The electro-optical glazing structure of claim 1, wherein said electro-optical glazing panel comprises:

a first electrically-active cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel;

a second electrically-active CLC electromagnetic radiation polarizing panel; and

an electrically-passive π-phase retardation panel interposed between said first and second electrically-active CLC electromagnetic radiation polarizing panels.

5. The electro-optical glazing structure of claim 4, wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels reflect electromagnetic radiation having a first circularly polarized state when said electro-optical glazing panel is switched to said first optical state of operation, wherein said first and second electrically-active CLC electromagnetic radiation polarizing

panels transmit electromagnetic radiation having either a right hand a second circularly polarized state and/or a wavelength outside said first prespecified bandwidth when said electro-optical glazing panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit electromagnetic radiation having either said first state or said second state when said electro-optical glazing panel is switched to said second optical state of operation.

6. The electro-optical glazing structure of claim 1, wherein said electro-optical glazing panel comprises:

first and a second electrically passive single layer electromagnetic radiation polarizing panels; and

an electrically-active π-phase retardation panel interposed between said first and second electrically-passive electromagnetic radiation polarizing panels.

7. The electro-optical glazing structure of claim 1, wherein said electro-optical glazing panel comprises:

a first electrically-active cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel; and

a second electrically-active CLC electromagnetic radiation polarizing panel adjacent said first electrically-active CLC electromagnetic radiation polarizing panel.

8. The electro-optical glazing structure of claim 7,

wherein said first electrically-active CLC electromagnetic radiation

polarizing panel reflects electromagnetic radiation having a first circularly polarized state when said electro-optical glazing panel is switched to said first optical state of operation, and

wherein said first electrically-active CLC electromagnetic radiation polarizing panel transmits electromagnetic radiation having a second circularly polarized [(RHCP)] state when said electro-optical glazing panel is switched to said first optical state of operation;

wherein said second electrically-active CLC electromagnetic radiation polarizing panel reflects electromagnetic radiation having said second state when said electro-optical glazing panel is switched to said first optical state of operation,

wherein said second electrically-active CLC electromagnetic radiation polarizing panels transmits electromagnetic radiation having said first state when said electro-optical glazing panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit more than 50% of electromagnetic radiation having either said first state or said second state when said electro-optical glazing panel is switched to said second optical state of operation.

9. The electro-optical glazing structure of claim 1, which further comprises:

a window frame for mounting said electro-optical glazing panel within a house or office building, or aboard a transportation vehicle.

10. The electro-optical glazing structure of claim 9, which further comprises:

a electromagnetic-sensor mounted on said window frame, for sensing electromagnetic conditions;

a battery supply mounted within said window frame, for providing electrical power;

a electromagnetic-powered battery recharger mounted within said window frame, for recharging the battery;

electrical circuitry mounted within said window frame, for producing glazing control voltages for switching said first and second optical states of operation; and

a programmable micro-computer chip mounted within said window frame, for controlling the operation of said battery recharger and said electrical circuitry, and the production of said glazing control voltages as required by a radiation flow control program stored within said programmable microcontroller.

11. The electro-optical glazing structure of claim 1, further comprising: a frame for an intelligent pair of sunglasses; and

a pair of said optical glazing elements supported within said frame,

wherein each said optical element is realized using said electro-optical glazing structure of claim 1.

12. An intelligent window system for dynamic electromagnetic radiation control which comprises:

a plurality of said electro-optical glazing structures of claim 10, each mounted within a house or office building, or aboard a transportation vehicle; and

a central control computer for coordinating the operation of said electro-optical glazing structures.

13. A composite electro-optical glazing structure which comprises:

a plurality of said electro-optical glazing structures of claim 1,

stacked together as a composite electro-optical structure,

wherein said composite electro-optical structure has more than two said optical states of operation which permit complex levels of electromagnetic radiation control.

14. A stereoscopic 3-D viewing device in the form of eyeglasses, comprising:

a pair of optical elements positionable before the eyes of a user of said eyeglasses, each said optical element including said electro-optical glazing structure of claim 1,

whereby said eyeglasses can control electromagnetic radiation during stereoscopic 3-D viewing or monoscopic 2-D viewing of displayed images (i.e. virtual world viewing), or during stereoscopic viewing of real world objects.

15. An electro-optical glazing structure which has high reflection, semi-transparent and greater than 50% transparent modes of operation for improved control over the flow of electromagnetic radiation within the solar region of the electromagnetic spectrum (i.e. Solar Spectrum).

16. A reflective electro-optical glazing structure, in which the modes of operation can be electrically-activated or switched, while avoiding the use of energy absorbing mechanisms.

17. The electro-optical glazing structure of claim 1, wherein the transmission of the visible portion of the electromagnetic spectrum is controlled and wherein the IR portion of the electromagnetic spectrum is reflected.

18. An electro-optical glazing structure, comprising an

electrically-active phase retardation panel interposed between a pair of single layer electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a first linear polarization state, whereby a highly reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

19. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a first and a second electrically-passive electromagnetic radiation polarizing panel, the first panel reflecting electromagnetic radiation of a first linear polarization state, the second panel reflecting electromagnetic radiation of a second linear polarization state, whereby a reflective state of operation and a semi-transparent state of operation are provided over a region of the electromagnetic spectrum.

20. The electro-optical glazing structure of claim 19, wherein the first and a second electrically-passive electromagnetic radiation polarizing panels are single layer polarizing panels.

21. An electro-optical glazing structure, comprising an electrically-passive π-phase retardation panel interposed between a pair of electrically-active CLC electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a first circularly polarized state, whereby a highly reflective state of operation and a highly transparent state of operation are provided over a region of the electromagnetic spectrum.

22. An electro-optical glazing structure, comprising a pair of

electrically-active CLC electromagnetic radiation polarizing panels, one of which is capable of reflecting electromagnetic radiation of a first circularly polarized state and the other of which is capable of reflecting electromagnetic radiation of a second circularly polarized state, whereby a highly reflective state of operation and a highly transpare nt state of operation are provided over a region of the electromagnetic spectrum.

23. An actively-controlled window or viewing panel constructed from the electro-optical glazing structure of claim 1, wherein the transmission and reflection of electromagnetic radiation can be dynamically controlled over a broad-band region of the electromagnetic spectrum, from greater than 50% transmission to high reflection.

24. An actively-controlled window or viewing panel constructed from the electro-optical glazing structure of claim 1, wherein the electromagnetic radiation over the IR region of the electromagnetic spectrum can be reflected, rather than absorbed, reducing the temperature cycle range which the window structure is required to undergo.

25. An intelligent window system for installation within a house or office building, or aboard a transportation vehicle such as an airplane or automobile, wherein an electro-optical glazing structure of claim 1 is supported within a prefabricated window frame, within which are mounted: a electromagnetic-sensor for sensing electromagnetic conditions in the outside environment; a battery supply for providing electrical power; a electromagnetic-powered battery recharger for recharging the battery; electrical circuitry for producing glazing control voltages for driving the electrically-active elements of the

electro-optical glazing supported within the window frame; and a micro-computer chip for controlling the operation of the battery recharger and electrical circuitry and the production of glazing control voltages as required by a radiation flow control program stored within the programmed microcontroller.

26. The electro-optical glazing structure of claim 1which is designed for integration within the heating/cooling system of a house, office building, factory or vehicle in order to control the flow of broad-band electromagnetic radiation through the electro-optical window structure, while minimizing thermal loading upon the heating/cooling system thereof.

27. An intelligent pair of shutter glasses, in which each optical element is realized using an electro-optical glazing structure of claim 1fashioned to the dimensions of a shutter glass frame.

28. The electro-optic glazing structure of claim 1, further comprising:

a reflecting layer for reflecting infrared light, wherein the electro-optic glazing structure of claim 1 controls the transmission and reflection of visible light.

29. The electro-optic glazing structure of claim 1, further comprising: a reflecting layer for reflecting UV light, wherein the electro-optic glazing structure of claim 1 controls the transmission and reflection of visible light.

30. The electro-optic glazing structure of claim 1, further comprising:

a electro-optic glazing structure which controls the transmission and

reflection of IR light, wherein the electro-optic glazing structure of claim 1 separately controls the transmission and reflection of visible light.

31. The electro-optic glazing structure of claim 1, further comprising:

a electro-optic glazing structure which controls the transmission and reflection of visible light, wherein the electro-optic glazing structure of claim 1 separately controls the transmission and reflection of IR light.

32. An electro-optical glazing structure having reflection and transmission modes of operation for selectively reflecting and transmitting electromagnetic radiation, respectively, the electro-optical glazing structure comprising:

an electro-optical panel of multilayer construction, having first and second optical states of operation;

optical state switching means for switching the electro-optical panel to the first optical state of operation in order to induce the electro-optical glazing structure into the reflection mode of operation, and for switching the electro-optical panel to the second optical state of operation in order to induce the electro-optical glazing structure into the transmission mode of operation, and

means for further controlling electromagnetic radiation incident on the electro-optical panel.

33. The electro-optical glazing structure of claim 32, wherein the means for further controlling the electromagnetic radiation comprises a means for reflecting circularly polarized light.

34. The electro-optical glazing structure of claim 33, wherein the means for reflecting circularly polarized light comprise a cholesteric liquid crystal (CLC) reflector.

35. The electro-optical glazing structure of claim 32, wherein the means for further controlling the electromagnetic radiation comprises a scattering layerfor controllably scattering light.

36. The electro-optical glazing structure of claim 35, wherein the scattering layer comprises a fluid medium containing a large plurality of anisotropically shaped objects for controllably scattering light, the orientation of anisotropically shaped objects controllable by a field.

37. The electro-optical glazing structure of claim 36x, wherein the anisotropically shaped objects are micron size sheets of reflecting material.

38. The electro-optical glazing structure of claim 37, wherein the micron size sheets of reflecting material are multilayer polymer reflectors.

39. The electro-optical glazing structure of claim 37, wherein the micron size sheets of reflecting material are cholesteric liquid crystal (CLC) reflectors.

40. The electro-optical glazing structure of claim 35, wherein the scattering layer comprises a polymerized polymer region containing a large plurality of inclusions of liquid crystal material.

41. The electro-optical glazing structure of claim 40, wherein the scattering layer comprises a polymer dispersed liquid crystal (PDLC) layer.

42. The electro-optical glazing structure of claim 35, wherein the scattering layer comprises a mixture of a polymer and a liquid crystal material.

43. The electro-optical glazing structure of claim 42, wherein the scattering layer may be made non scattering under the influence of an electric field.

44. The electro-optical glazing structure of claim 32, wherein the means for further controlling the electromagnetic radiation comprises a mixture of a polymer and a liquid crystal material.

45. The electro-optical glazing structure of claim 44, wherein the mixture of polymer and liquid crystal material is transparent to the electromagnetic radiation incident on the electro-optical panel when an electric field is induced in the mixture.

46. The electro-optical glazing structure of claim 44, wherein the mixture of polymer and liquid crystal material reflects a portion of the electromagnetic radiation incident on the electro-optical panel when no electric field is induced in the mixture.

47. An electro-optical glazing structure having reflection and transmission modes of operation for selectively reflecting and transmitting electromagnetic radiation, respectively, the electromagnetic radiation having a first and a second linear polarization, the electro-optical glazing structure comprising:

an electro-optical panel having first and second optical states of operation; and

optical state switching means for switching the electro-optical

panel to the first optical state of operation in order to induce the electro-optical glazing structure into the reflection mode of operation, and for switching the electro-optical panel to the second optical state of operation in order to induce the electro-optical glazing structure into the transmission mode of operation,

wherein the electro-optical panel comprises:

a sheet having a large plurality of pairs of layers parallel to a surface of the sheet, each pair of layers having a difference between the materials in each layer of the pair, the difference being in the index of refraction for electromagnetic radiation having the first linear polarization, wherein there is little difference in the index of refraction for electromagnetic radiation having the second linear polarization, the total thickness of each pair of layers in the large plurality of layers varying non linearly across the sheet.

48. The electro-optical glazing structure of claim 47, wherein the electro-optical panel further reflects circularly polarized electromagnetic radiation.

49. The electro-optical glazing structure of claim 48, wherein the electro-optical panel comprises a cholesteric liquid crystal (CLC) material.

50. The electro-optical glazing structure of claim 47, wherein thE electro-optical panel selectively transmits and reflects electromagnetic radiation of a first bandwidth of the EM spectrum, further comprising a reflector of EM radiation which reflects radiation in a second bandwidth of the EM spectrum, the reflector of EM radiation comprising a sheet having a large plurality of pairs of layers parallel to a surface of the sheet, each pair of layers having a difference in the index of refraction

between the materials in each layer of the pair.

51. The electro-optical glazing structure of claim 50, wherein the reflector of EM radiation comprises a sheet having a large plurality of pairs of layers parallel to a surface of the sheet, each pair of layers having a difference in the index of refraction between the materials in each layer of the pair. The total thickness of each pair of layers in the large plurality of layers varying non linearly across the sheet.

52. The electro-optical glazing structure of claim 47, further comprising a controllable scattering layer.

53. The electro-optical glazing structure of claim 52, wherein the controllable scattering layer comprises a fluid medium containing a large plurality of anisotropically shaped objects for controllably scattering light, the orientation of anisotropically shaped objects controllable by a field.

54. The electro-optical glazing structure of claim 47, wherein electrooptic panel further comprises a means for reflecting circularly polarized light.

55. The electro-optical glazing structure of claim 54, wherein the means for reflecting circularly polarized light comprise a cholesteric liquid crystal (CLC) reflector.

56. The electro-optical glazing structure of claim 47, wherein the electro-optic panel further comprises a scattering layer for controllably scattering light.

57. The electro-optical glazing structure of claim 56, wherein the scattering layer comprises a fluid medium containing a large plurality of anisotropically shaped objects for controllably scattering light, the orientation of anisotropically shaped objects controllable by a field.

58. The electro-optical glazing structure of claim 57, wherein the anisotropically shaped objects are micron size sheets of reflecting material.

59. The electro-optical glazing structure of claim 58, wherein the micron size sheets of reflecting material are multilayer polymer reflectors.

60. The electro-optical glazing structure of claim 58, wherein the micron size sheets of reflecting material are cholesteric liquid crystal (CLC) reflectors.

61. The electro-optical glazing structure of claim 56, wherein the scattering layer comprises a polymerized polymer region containing a large plurality of inclusions of liquid crystal material.

62. The electro-optical glazing structure of claim 61, wherein the scattering layer comprises a polymer dispersed liquid crystal (PDLC) layer.

63. The electro-optical glazing structure of claim 56, wherein the scattering layer comprises a mixture of a polymer and a liquid crystal material.

64. The electro-optical glazing structure of claim 63, wherein the

scattering layer may be made non scattering under the influence of an electric field.

65. The electro-optical glazing structure of claim 47, wherein the electro-optical panel further comprises a layer of a mixture of a polymer and a liquid crystal material.

66. The electro-optical glazing structure of claim 65, wherein the mixture of polymer and liquid crystal material is transparent to the electromagnetic radiation incident on the electro-optical panel when an electric field is induced in the mixture.

67. The electro-optical glazing structure of claim 65, wherein the mixture of polymer and liquid crystal material reflects a portion of the electromagnetic radiation incident on the electro-optical panel when no electric field is induced in the mixture.

68. An electro-optical glazing structure having total-reflection and transparent modes of operation for selectively reflecting and transmitting electromagnetic radiation without absorption, respectively, said electro-optical glazing comprising:

an electro-optical panel of laminated construction, having first and second optical states of operation; and

optical state switching means for switching said electro-optical panel to said first optical state of operation in order to induce said electro-optical glazing into said total-reflection mode of operation, and for switching said electro-optical panel to said second optical state of operation in order to induce said electro-optical glazing into said transmission mode of operation,

wherein electromagnetic radiation within a first prespecified

bandwidth falling incident upon said electro-optical panel is totally reflected from said electro-optical panel without absorption when said electro-optical panel is switched to said first optical state of operation, and

wherein electromagnetic radiation within a second prespecified bandwidth falling incident upon said electro-optical panel is transmitted through said electro-optical panel without absorption when said electro-optical panel is switched to said second optical state of operation.

69. The electro-optical glazing structure of claim 68, wherein said first prespecified bandwidth comprises the infrared (IR) portion and ultra-violet (UV) portions of the electromagnetic spectrum, and said second prespecified bandwidth comprises said IR portion, said UV portion and the visible portion of the electromagnetic spectrum.

70. The electro-optical glazing structure of claim 68, wherein said electro-optical panel comprises:

a first electrically-passive cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel;

a second electrically-passive CLC electromagnetic radiation polarizing panel; and an electrically-active π-phase retardation panel interposed between said first and second electrically-passive CLC electromagnetic radiation polarizing panels.

71. The electro-optical glazing structure of claim 70,

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels totally reflect without absorption electromagnetic radiation having a left hand circularly polarized (LHCP) state and a wavelength within said first prespecified

bandwidth when said electro-optical panel is switched to said first optical state of operation,

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either a right hand circularly polarized (RHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

72. The electro-optical glazing structure of claim 68, wherein said electro-optical panel comprises:

a first electrically-active cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel;

a second electrically-active CLC electromagnetic radiation polarizing panel; and an electrically-passive π-phase retardation panel interposed between said first and second electrically-active CLC electromagnetic radiation polarizing panels.

73. The electro-optical glazing structure of claim 72,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels totally reflect without absorption electromagnetic radiation having a left hand circularly polarized (LHCP) state and a wavelength within said first prespecified

bandwidth when said electro-optical panel is switched to said first optical state of operation,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either a right hand circularly polarized (RHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

74. The electro-optical glazing structure of claim 72,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels totally reflect without absorption electromagnetic radiation having a right hand circularly polarized (RHCP) state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either a left hand circularly polarized (LHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption

electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

75. The electro-optical glazing structure of claim 68, wherein said electro-optical panel comprises:

a first electrically-active cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel; and

a second electrically-active CLC electromagnetic radiation polarizing panel adjacent said first electrically-active CLC electromagnetic radiation polarizing panel.

76. The electro-optical glazing structure of claim 75,

wherein said first electrically-active CLC electromagnetic radiation polarizing panel totally reflects without absorption electromagnetic radiation having a left hand circularly polarized (LHCP) state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation, and

wherein said first electrically-active CLC electromagnetic radiation polarizing panels transmits without absorption electromagnetic radiation having either a right hand circularly polarized (RHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation;

wherein said second electrically-active CLC electromagnetic radiation polarizing panel totally reflects without absorption electromagnetic radiation having said RHCP state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation, and

wherein said second electrically-active CLC electromagnetic radiation polarizing panels transmits without absorption electromagnetic radiation having either said LHCP state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

76. The electro-optical glazing structure of claim 68, which further comprises:

a window frame for mounting said electro-optical panel within a house or office building, or aboard a transportation vehicle;

77. The electro-optical glazing structure of claim 76, which further comprises:

a electromagnetic-sensor mounted on said window frame, for sensing electromagnetic conditions;

a battery supply mounted within said window frame, for providing electrical power;

a electromagnetic-powered battery recharger mounted within said window frame, for recharging the battery;

electrical circuitry mounted within said window frame, for producing glazing control voltages for switching said first and second optical states of operation; and

a programmable micro-computer chip mounted within said window frame, for controlling the operation of said battery recharger

and said electrical circuitry, and the production of said glazing control voltages as required by a radiation flow control program stored within said programmable microcontroller.

78. An intelligent pair of sunglasses, comprising:

a frame; and

a pair of optical element supported within said frame,

wherein each said optical element is realized using said electro-optical glazing structure of claim 1.

79. An intelligent window system for dynamic electromagnetic radiation control which comprises:

a plurality of said electro-optical glazing structures of claim 11, each mounted within a house or office building, or aboard a transportation vehicle; and

a central control computer for coordinating the operation of said electro-optical glazing structures.

80. An composite electro-optical glazing structure which comprises:

a plurality of said electro-optical glazing structures of claim 1, stacked together as a composite electro-optical structure,

wherein said composite electro-optical structure has more than two said optical states of operation which permit complex levels of electromagnetic radiation control.

81. A stereoscopic 3-D viewing device in the form of eyeglasses, comprising:

a pair of optical elements positionable before the eyes of a user of said eyeglasses,

each said optical element including said electro-optical glazing

structure of claim 1,

whereby said eyeglasses can control electromagnetic radiation during stereoscopic 3-D viewing or monoscopic 2-D viewing of displayed images (i.e. virtual world viewing), or during stereoscopic viewing of real world objects.

82. An electro-optical glazing structure which has total-reflection, semi-transparent and totally transparent modes of operation for improved control over the flow of electromagnetic radiation within the solar region of the electromagnetic spectrum (i.e. Solar Spectrum).

83. An electro-optical glazing structure, in which the modes of operation can be electrically-activated or switched, while avoiding the use of energy absorbing mechanisms.

84. An electro-optical glazing structure having a broad band of operation, including the IR, visible and UV portions of the electromagnetic spectrum.

85. An electrically-active -phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a certain polarization state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

86. An electro-optical glazing structure, comprising an electrically-active -phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a linear polarization

state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

87. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a linear polarization state, one is parallel to other, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

88. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a linear polarization state, one is perpendicular to other, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

89. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a LHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

90. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive CLC electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a RHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

91. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive CLC electromagnetic radiation polarizing panels, one of which is capable of reflecting electromagnetic radiation of the LHCP state and the other of which is capable of reflecting electromagnetic radiation of the RHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

92. An electro-optical glazing structure, comprising an electrically-passive π-phase retardation panel interposed between a pair of electrically-active CLC electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of the LHCP state, whereby a totally reflective state of operation and a totally transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

93. An electro-optical structure, comprising an electrically-passive π-phase retardation panel interposed between a pair of electrically-active CLC electromagnetic radiation polarizing panels, both of which are

capable of reflecting electromagnetic radiation of the RHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

94. An electro-optical glazing structure, comprising a pair of electrically-active CLC electromagnetic radiation polarizing panels, one of which is capable of reflecting electromagnetic radiation of the LHCP state and the other of which is capable of reflecting electromagnetic radiation of the RHCP state, whereby a totally reflective state of operation and a totally transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

95. An actively-controlled window or viewing panel constructed from the electro-optical glazing structure of the present invention, wherein the transmission of electromagnetic radiation can be dynamically controlled over a broad-band region of the electromagnetic spectrum, between 50% transmission to 100% reflection and between 100% transmission to 100% reflection.

96. An actively-controlled window or viewing panel constructed from an electro-optical glazing structure, wherein the transmission of electromagnetic radiation over the UV and IR regions of the electromagnetic spectrum can be totally reflected, rather than absorbed, reducing the temperature cycle range which the window structure is required to undergo.

97. An actively-controlled window or viewing panel constructed from an electro-optical glazing structures, wherein only UV and IR radiation is reflected at the window surface, while electromagnetic radiation over

the visible band is transmitted to the interior environment being maintained under thermal control.

98. An intelligent window system for installation within a house or office building, or aboard a transportation vehicle such as an airplane or automobile, wherein an electro-optical glazing structure thereof is supported within a prefabricated window frame, within which are mounted: a electromagnetic-sensor for sensing electromagnetic conditions in the outside environment; a battery supply for providing electrical power; a electromagnetic-powered battery recharger for recharging the battery; electrical circuitry for producing glazing control voltages for driving the electrically-active elements of the electro-optical glazing supported within the window frame; and a micro-computer chip for controlling the operation of the battery recharger and electrical circuitry and the production of glazing control voltages as required by a radiation flow control program stored within the programmed microcontroller.

99. An electro-optical window structure which is designed for integration within the heating/cooling system of a house, office building, factory or vehicle in order to control the flow of broad-band electromagnetic radiation through the electro-optical window structure, while minimizing thermal loading upon the heating/cooling system thereof.

100. An intelligent pair of shutter glasses, in which each optical element is realized using an electro-optical glazing structure fashioned to the dimensions of a shutter glass frame.